FROM SCHIZOTYPAL PERSONALITY TO SCHIZOTYPAL DIMENSIONS: 
A TWO-STEP TAXOMETRIC STUDY

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Abstract

Objective: Various studies have explored the latent structure of schizotypy as conceptualized by Meehl, using Chapman scales. Conversely, a few studies have examined the latent structure of schizotypal personality as described by the nine DSM diagnostic criteria (unchanged from DSM-III-R to DSM-IV-TR). Therefore, it is not clear if this construct has to be considered as categorical or dimensional.

Method: A taxometric analysis (MAMBAC, MAXCOV) was performed in a sample of 400 undergraduate students using the Schizotypal Personality Questionnaire (SPQ), a DSM-based self-report. This procedure represents one of the most powerful techniques to examine the latent structure of a construct. In a second research phase, we separately analyzed the latent structure of different schizotypal personality dimensions, detected by an item-level factor analysis.

Results: The first finding of this study was that schizotypal personality, as assessed by the SPQ, is best conceptualized as a dimensional, not categorical, construct. Taxometric analyses, performed on three of the four SPQ factors (Unusual Beliefs and Experiences, Mistrust, Social Anhedonia, and Eccentric/Odd Behavior), yielded taxonic findings only for the Unusual Beliefs and Experiences construct, with a MAXCOV base rate of .11. Instead, the other two examined construct (Mistrust and Social Anhedonia) were more consistent with a dimensional underlying structure. Finally, we found that the taxonic group membership increased significantly the probability of having a first-degree relative with a diagnosis of schizophrenia.

Conclusions: Our results suggest that positive schizotypy (as assessed by the SPQ subscales Magical Thinking and Unusual Perceptual Experiences) may be a phenotype for genetic investigation of schizophrenia. Our results emphasize the central role of positive schizotypy in comprehending etiopathogenetic mechanisms underlying schizophrenia.

Key words: latent structure, schizotypy, schizotypal personality, first-degree relatives

Declaration of interest: none

Introduction

Meehl (1962) suggested that schizotypy is the phenotypic manifestation of a genetically transmitted integrative neural defect, called schizotaxia. According to Meehl, nearly all schizotaxic individuals develop schizotypy, i.e. a psychological and personality organization associated with a latent liability for schizophrenia. Meehl focused on four clinical symptoms of schizotypy: anhedonia, cognitive slippage, interpersonal aversiveness, and ambivalence.

Like schizotypy, Schizotypal Personality Disorder (SPD) is considered a clinical condition genetically linked to schizophrenia. SPD has a higher incidence among non-psychotic first-degree relatives of schizophrenics (from 4.2% to 14.6%), with a heritability rate of .61 (Tarbox and Pogue-Geile 2011). Schizotypal subjects seem to present an increased risk to develop psychosis, although this question has not been widely studied. It is necessary to emphasize that Meehl’s construct of schizotypy is not synonymous with the SPD: the symptoms described by Meehl reflect an underlying liability for schizophrenia, and not a specific personality disorder. However, there are various similarities between the DSM diagnostic criteria for SPD and the schizotypic symptoms proposed by Meehl.

On the basis of Meehl’s theory, Chapman’s team developed various schizotypy scales (Chapman et al. 1995). These instruments tap several aspects of schizotypy, including physical and social anhedonia, perceptual aberration and magical ideation. In addition to Chapman’s team, other researchers have developed self-report measures to identify schizotypic individuals. The Schizotypal Personality Questionnaire (SPQ; Raine 1991) is the only self-report measure that is based on the DSM diagnostic criteria (unchanged from DSM-III-R to DSM-IV-TR) for SPD.

A partially solved problem concerns the categorical
versus dimensional nature of schizotypy. In order to investigate this question, various statistical techniques have been developed. Among these, the taxometric analysis (Meehl 1995, Waller and Meehl 1998) represents one of the most powerful procedures to examine the latent structure of a construct. The latent structure of schizotypy was examined in various taxometric studies, mainly using the Chapman scales in undergraduate samples. The findings provide evidence of a taxonic structure (with a base rate of about .10) of perceptual aberration (Lenzenweger and Korfine 1992, Korfine and Lenzenweger 1995, Lenzenweger 1999, Meehl and Keller 2001, Horan et al. 2004) and social anhedonia (Blanchard et al. 2000, Horan et al. 2004). On the contrary, taxometric analyses seem to indicate that magical thinking is a dimensional construct (Meyer and Keller 2001, Horan et al. 2004, Rawlings et al. 2008).

In the last years, the use of simulated comparison data (Ruscio et al. 2007) has become increasingly popular in taxometric research. Rawlings et al. (2008) investigated the latent structure of schizotypy using this procedure. The authors administered the Chapman scales in a sample of non-clinical adults, finding a dimensional structure for all instruments. These results challenge the categorical model of schizotypy proposed by Meehl (1962, 1990) and partially confirmed by various taxometric analyses (Haslam 2003, Haslam et al. 2012). However, the study of Rawlings et al. was criticized by Beauchaine et al. (2008) for some methodological problems. Moreover, these authors underline that taxonic findings on the structure of schizotypy are also supported by studies using more sensitive measures than rating scales.

Rawlings et al. (2008) and Beauchaine et al. (2008) identify two different theoretical views on the latent structure and etiology of schizotypy. The fully dimensional view considers schizotypy as a biologically based personality trait that, in its maladaptive form, can lead to schizotypal personality or schizophrenic disorder. On the basis of this model, schizophrenia derives from a quantitative amplification of a trait shared with healthy people. Instead, the quasi-dimensional model of Meehl (1962, 1990) considers schizotypy as the manifestation of an underlying genetic diathesis to schizophrenia. For this view, there is dimensionality only within the schizophrenia spectrum. Instead, between schizotypic and non-schizotypic subjects there exists a qualitative difference, due to a different genetic background. Up until today, the taxometric evidence, with few exceptions, support Meehl’s hypothesis. However, the findings of Rawlings et al. (2008) have reanimated the debate about this important issue.

Unlike the Chapman scales, only two taxometric studies have been conducted using the SPQ. Keller et al. (2001) found evidence of taxonicity for negative schizotypal features (Constricted Affect, No Close Friends, and Social Anxiety subscales), and evidence of dimensionality for positive schizotypal aspects (Paranoia, Odd Speech, Unusual Perceptual Experiences, Ideas of Reference, and Odd Behavior subscales). However, the authors examined individual schizotypal dimensions, and they did not consider the SPQ total scale. Conversely, Fossati et al. (2007) performed a maximum covariance analysis (MAXCOV; Meehl and Yonce 1996), using as indicators the total scores of the SPQ and of two other schizotypal scales. The findings provided evidence of a taxonic latent structure of schizotypal personality in the undergraduate sample, but not in the high school sample. The mean base rate of the taxon was approximately .15. This estimate partially agreed with that found in other schizotypy studies.

This is a research designed to examine the latent structure of schizotypal personality. We conducted a two-step taxometric study using the SPQ in an undergraduate sample. In the first research phase, we conducted a taxometric analysis with the purpose to verify if the underlying structure of schizotypal personality was taxonic or dimensional. In the second research phase, we separately analyzed the latent structure of different schizotypal dimensions, detected by an item-level factor analysis.

Method

Participants

Participants were recruited from the University of Urbino (Italy). Informed voluntary written consent was obtained from all subjects. The study was approved by Human Subjects Review Committee of the University of Urbino. Participants were undergraduates between the ages of 18 and 27, who were enrolled in various courses of the university. Subjects were excluded from the research for lack of fluency in Italian. The sample comprised 400 university students (70 males and 330 females) with a mean age of 22.56 years (18-27, SD = 2.63).

Measures

Subjects completed the SPQ (Raine 1991) as part of a battery of measures. The SPQ is a 74-item, true/false, self-report questionnaire measuring the nine DSM-III-R (American Psychiatric Association, 1987) diagnostic criteria for SPD: Ideas of Reference, Magical Thinking, Unusual Perceptual Experiences, Odd Speech, Paraonia, Constricted Affect, Odd Behavior, No Close Friends, Social Anxiety. In this study, an Italian version of the SPQ (Fossati et al. 2003) was used. This version of the SPQ showed adequate internal reliability in both high school (Cronbach’s α = 0.87) and university (Cronbach’s α = 0.90) student samples.

Data Analysis

The study was conducted in two distinct phases. In Phase 1, we conducted a taxometric analysis of the full SPQ scale. In Phase 2, we initially performed an item-level factor analysis of the SPQ; then taxometric analysis was carried out for each factor.

Factor analysis. Factor analysis was performed using MPlus (Muthén and Muthén 2004). MPlus software uses tetrachoric correlations matrix to estimate the underlying structure of dichotomous variables. The factors were extracted using the unweighted least
squares estimator. To decide how many factors to extract, we initially considered the scree plot, then we investigated nine possible solutions (from 1 to 9 factors, corresponding to the SPQ subscales). We selected items with factor-loadings ≥ .35 on one factor and cross-loadings ≤ .30 on any other factor.

**Taxometric analyses.** Two different taxometric techniques were employed: MAMBAC (Meehl and Yonce 1994) and MAXCOV (Meehl and Yonce 1996). MAMBAC requires at least two valid indicators: one variable is used as input indicator (x axis), and the other one is used as output indicator (y axis). Cases are sorted from lowest to highest on the input variable. Then, a number of cutting scores (50 in this study) are created at regular intervals. For each input cut, the mean score on the output variable for all cases falling below the cut is subtracted from the mean score of all cases falling above the cut. Each mean difference is plotted as the corresponding y-value on the MAMBAC graph. Whereas taxonic data yield a peaked curve, dimensional data yield a concave or dish shape curve. In Phase 1, MAMBAC was performed by removing one variable at a time to serve as the output indicator and summing the remaining variables to serve as a composite input indicator. In Phase 2, for two factors, MAMBAC procedure was performed using all possible pairwise input-output indicator configurations. MAXCOV requires at least three valid indicators. One variable acts as input indicator, and the other two are treated as output indicators. A series of ordered subsamples are formed along the input variable and the covariance between the output variables is computed for each subsample. Following Walters and Ruscio (2010), MAXCOV was implemented creating 25 sliding windows with 90% overlap. The maximum covariance should be reached in the subsample containing an equal mix of the latent taxa and the complement (called HITMAX interval). For taxonic distributions, covariance curves take on a distinctive peak at the point of maximum covariance. For dimensional latent structure, covariance peaks are not identifiable and covariance plots are either flat or inconsistently peaked. MAXCOV was conducted on all possible pairwise input/output indicator configurations, producing 12 curves for the four indicators.

For both MAMBAC and MAXCOV analyses, the location of the peak provides an estimate of the base rate of the latent taxon in the sample.

**Consistency tests.** The use of consistency tests is highly recommended in the taxometric methods (Waller and Meehl 1998). An important check concerns the comparison between results of different techniques. For instance, if MAMBAC and MAXCOV (two non-redundant taxometric procedures) yield similar results, we can draw more correct conclusions about the latent structure.

We performed taxometric analysis using Ruscio (2009) taxometric programs for R. To clarify interpretation of the taxometric results, Ruscio’s programs provide a bootstrap method (Ruscio et al. 2007) that generates simulated samples of taxonic and dimensional data sets with the same sample size, indicator distributions, and indicator correlations as the research data. By comparing the shape of the research data plots to the plots of the simulated taxonic and dimensional data, the investigator can draw more definitive conclusions about the latent structure of the construct. Rusco’s programs also provide a Comparison Curve Fit Index (CCFI; Ruscio et al. 2010), which is an objective numerical measure of whether the data plots are more consistent with a taxon or dimension. The CCFI values range from 0 (strongest support for dimensional structure) to 1 (strongest support for taxonic structure), with .50 representing the most ambiguous result. For each analysis, 10 simulated taxonic and 10 simulated dimensional data sets were generated. MAMBAC and MAXCOV curves were averaged for display and plotted with taxonic and dimensional comparison data. The base rates produced by MAMBAC and MAXCOV were used both to assign cases to groups and to generate comparison data.

The inchworm consistency test (Waller and Meehl 1998) is another procedure used to disambiguate taxometric results for small taxa and dimensional constructs with positively skewed indicators. By increasing the number of overlapping windows in maximum eigenvalue (MAXEIG; Waller and Meehl 1998) or MAXCOV, previously ambiguously graphed taxonic structures begin to reveal clearly-defined peaked graphs, with dimensional latent structures remaining ambiguous or flat.

**Indicators selection.** Composite indicators were created trying to maximize between-group validity, minimize nuisance covariance, and obtain a good d value. In Phase 1, the subscales Ideas of Reference, Magical Thinking, and Unusual Perceptual Experiences were combined to form the first indicator; the subscales Social Anxiety, No Close Friends, and Constricted Affect were combined to form the second indicator; the subscales Odd Behavior and Odd Speech were combined to form the third indicator; finally, the Paranoia subscale alone constituted the fourth indicator. In Phase 2, we constructed a set of composite indicators for each factor, following the same empirical criteria.

**Results**

**Phase 1**

MAMBAC analysis produced an averaged curve slightly concave and without any taxonic peak. The shape of the curve was consistent with a dimensional model of schizotypal personality. This finding was confirmed by a high base rate of .47 (M = .47, SD = .05). The research data were more similar to simulated dimensional data (figure 1). The CCFI value of .378 was consistent with the visual inspection. The distribution of the four indicators is summarized in table 1. MAXCOV analysis provided results suggestive of dimensionality. As can be seen in figure 2, the MAXCOV curve was dish shaped and more similar to simulated dimensional data. This finding was confirmed by the CCFI value of .188. The base rate estimate for averaged curve was .29 (M = .39, SD = .22). In both MAMBAC and MAXCOV analyses, all indicators showed effect sizes greater than the threshold
Figure 1. Averaged MAMBAC curves for SPQ. Research data are indicated by darker lines; comparison data are indicated by lighter lines.

MAMBAC (CCFI = .378)

![MAMBAC Graph](image)

Table 1. Phase 1: Distribution of the Indicators for SPQ

<table>
<thead>
<tr>
<th>Indicatorsa</th>
<th>Skew: full sample (taxon/complement)</th>
<th>Correlations: full sample (taxon/complement)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MAMBAC</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>0.61 (0.12/0.74)</td>
<td>1.69</td>
</tr>
<tr>
<td>2</td>
<td>0.88 (0.49/0.86)</td>
<td>1.33</td>
</tr>
<tr>
<td>3</td>
<td>0.94 (0.44/0.23)</td>
<td>1.77</td>
</tr>
<tr>
<td>4</td>
<td>0.89 (0.45/0.77)</td>
<td>1.56</td>
</tr>
<tr>
<td>M</td>
<td>0.83 (0.38/0.90)</td>
<td>1.59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>MAXCOV</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.61 (0.05/0.66)</td>
<td>1.78</td>
</tr>
<tr>
<td>2</td>
<td>0.88 (0.42/0.95)</td>
<td>1.27</td>
</tr>
<tr>
<td>3</td>
<td>0.94 (0.24/1.06)</td>
<td>1.79</td>
</tr>
<tr>
<td>4</td>
<td>0.89 (0.32/0.59)</td>
<td>1.80</td>
</tr>
<tr>
<td>M</td>
<td>0.83 (0.26/0.81)</td>
<td>1.66</td>
</tr>
</tbody>
</table>

* Indicator 1 was composed by summing SPQ subscales: Ideas of Reference, Magical Thinking, and Unusual Perceptual Experiences; Indicator 2 was composed by summing SPQ subscales: Social Anxiety, No Close Friends, and Constricted Affect; Indicator 3 was composed by summing SPQ subscales: Odd Behavior and Odd Speech; Indicator 4 was represented by the Paranoia subscale.
Figure 2. Averaged MAXCOV curves for SPQ. Research data are indicated by darker lines; comparison data are indicated by lighter lines.

MAXCOV (CCFI = .188)

![Graph showing MAXCOV curves]

Table 2. Phase 2: Distribution of the Indicators and base rates estimated for the three indicator sets.

<table>
<thead>
<tr>
<th>Indicator sets</th>
<th>Skew: full sample</th>
<th>d</th>
<th>Correlations: full sample</th>
<th>Base rate a</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(taxon/complement)</td>
<td></td>
<td>(taxon/complement)</td>
<td></td>
</tr>
<tr>
<td><strong>MAMBAC</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unusual Beliefs and Experiences</td>
<td>1.06 (0.04/0.93)</td>
<td>2.41</td>
<td>.51 (.12/0.09)</td>
<td>.19</td>
</tr>
<tr>
<td>Mistrust</td>
<td>0.77 (0.13/0.87)</td>
<td>1.91</td>
<td>.56 (.23/.12)</td>
<td>.39</td>
</tr>
<tr>
<td>Social Anhedonia</td>
<td>0.98 (0.16/1.20)</td>
<td>1.92</td>
<td>.50 (.16/.13)</td>
<td>.28</td>
</tr>
<tr>
<td><strong>MAXCOV</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unusual Beliefs and Experiences</td>
<td>1.06 (-0.20/93)</td>
<td>2.58</td>
<td>.51 (.00/0.24)</td>
<td>.10</td>
</tr>
<tr>
<td>Mistrust</td>
<td>0.77 (-0.15/.77)</td>
<td>2.19</td>
<td>.56 (.07/.28)</td>
<td>.21</td>
</tr>
<tr>
<td>Social Anhedonia</td>
<td>0.98 (0.08/1.03)</td>
<td>2.08</td>
<td>.50 (.10/.20)</td>
<td>.18</td>
</tr>
</tbody>
</table>

Note. The values are averaged for each indicator set.

* The base rates provided are estimated on the averaged curve.

value of 1.25 (d_{MAMBAC} = 1.33 - 1.77, d_{MAXCOV} = 1.27 - 1.80), as suggested by Meehl (1995). Our dimensional results did not stem from high nuisance covariance: as can be seen in Table 1, the four indicators were correlated in the full sample (r = .43) and weakly correlated within groups.

Phase 2

Factor analysis. Following Chmielewski and Watson (2008), we performed an item-level factor analysis of the SPQ. Both visual inspection of the scree plot and interpretability of the solution suggested the
extraction of four factors. Since our dimensions were similar to four of the five factors found by Chmielewski and Watson (2008), we labeled the factors Unusual Beliefs and Experiences, Mistrust, Social Anhedonia, and Eccentric/Odd Behavior. The mean inter-correlation between the four factors (PROMAX rotation) was .25, ranging from .05 to .39. The Mistrust factor (18 items, $\alpha = .82$) was predominantly composed by Paranoia and Ideas of Reference items; the Unusual Beliefs and Experiences factor (12 items, $\alpha = .71$) was almost exclusively formed by Magical Thinking and Unusual Perceptual Experiences items; the Social Anhedonia factor (16 items, $\alpha = .78$) included Constricted Affect and No Close Friends items (and minimally Social Anxiety and Paranoia items); the Eccentric/Odd Behavior factor (5 items, $\alpha = .79$) was exclusively composed by five Odd Behavior items.

**Taxometric analyses.** Because the Eccentric/Odd Behavior factor was composed only by five dichotomous items, it was excluded from the analysis.
From schizotypal personality to schizotypal dimensions

**Figure 4.** Averaged MAMBAC and MAXCOV curves for the Mistrust factor. Research data are indicated by darker lines; comparison data are indicated by lighter lines.

MAMBAC (CCFI = .298)

MAXCOV (CCFI = .304)

For the Unusual Beliefs and Experiences factor, three indicators of four items were created, with five ordered categories (C) for each indicator; for the Mistrust factor, two indicators of four items (C = 5) and two indicators of five items (C = 6) were created; for the Social Anhedonia factor, four indicators of four items (C = 5) were created. The distribution of the three indicator sets is presented in table 2; because of limited space, only mean values were provided for each indicator set.

**Unusual beliefs and experiences.** For MAMBAC and MAXCOV, the three indicators showed a mean $d$ value respectively of 2.41 and 2.58. Within-group correlations for MAMBAC analysis ($M_{\text{taxon}} = .12$, $M_{\text{complement}} = .09$) were smaller than the mean full-sample correlation of .51. For MAXCOV, the mean within-complement correlation of .24 was less than half of the full-sample correlation.

The averaged MAMBAC curve was rising (figure 3), a shape consistent both with a small taxon and with positively skewed dimensional data. As can be seen...
Figure 5. Averaged MAMBAC and MAXCOV curves for the Social Anhedonia factor. Research data are indicated by darker lines; comparison data are indicated by lighter lines.

MAMBAC (CCFI = .325)

MAXCOV (CCFI = .126)

in table 2, our three indicators were positively skewed in the full sample (M skew = 1.01) and in the complement group (M skew = 0.93). However, the MAMBAC graph was more similar to the curve generated for the taxonic data than to the simulated dimensional data (figure 3). This fact was corroborated by the CCFI value of .698. The base rate estimate for averaged curve was .19 (M = .19, SD = .07).

MAXCOV analysis yielded a rising curve more similar to the taxonic comparison data, a finding corroborated by a CCFI of .730 (figure 3). The base rate estimate for averaged curve was .10 (M = .11, SD = .03), a value lower than that obtained by MAMBAC. On the other hand, MAMBAC could produce higher base rate estimates in the small taxon sample (Meehl and Yonce 1994). Therefore, MAXCOV and MAXEIG
TAXOMETRIC ANALYSIS OF THE SPQ

are more accurate in the calculation of the base rate. The inchworm procedure (Waller and Meehl 1998) was implemented in MAXEIG with 40, 80, 120, and 140 windows. As can be seen in figure 6, increasing the number of windows produced a clearer, although not very marked, right-end peak, a result probably due both to the small taxon sampling and to the relatively small sample size. Across MAXEIG analyses, the base rates estimated for averaged curves were .10 for 40 and 80 windows, and .11 for 120 and 140 windows. All these findings supported the evidence of a taxonic structure of the Unusual Beliefs and Experiences construct.

Mistrust. For MAMBAC and MAXCOV analyses, the mean d value was respectively 1.91 and 2.19. The four indicators were non-redundant: within-group correlations were smaller than full-sample correlations (table 2). The averaged MAMBAC curve was substantially concave, flat and rising due to skewed indicators (table 2). Furthermore, the empirical data plots resembled the simulated dimensional plots. The CCFI of .298 also supported a dimensional structure of the Mistrust construct.

Social anhedonia. As can be seen in table 2, the four indicators showed good between-group validity (dMAMBAC = 1.92, dMAXCOV = 2.08) and nuisance covariance was absent. The plots produced by the Social Anhedonia data resembled those generated by the simulated dimensional data (CCFI = .325) (figure 5). The base rate estimated for averaged curve was .28 (M = .27, SD = .06).

As can be seen in figure 5, the MAXCOV analysis provided an even more striking evidence of dimensionality (CCFI = .126). Taxonic data were expected to rise more sharply than the research data. The base rate estimated for averaged curve was .18 (M = .19, SD = .03). These findings were indicative of an underlying dimensional structure of the Social Anhedonia construct.

Relatives of schizophrenic patients. Among the participants, 3% (n = 12) declared to have at least one first-degree relative with a diagnosis of schizophrenia. Among these 12 participants, five (42%) were taxon members on the basis of MAXCOV results for the Unusual Beliefs and Experiences dimension. Taxon membership significantly increased the probability of having a first-degree relative with a diagnosis of schizophrenia: Yates corrected \( \chi^2(1, N = 400) = 6.81, p = .009 \) (two-tailed); Fisher’s exact test, \( p = .011 \) (two-tailed). This was not true for the other two factors.
Among the 12 relatives of patients with schizophrenia, one subject (8%) was in the top decile of the Mistrust distribution, and another was in the top decile of the Social Anhedonia distribution: Yates corrected $\chi^2 (1, N = 400) = 0.00, p = 1.000$ (two tailed); Fisher’s exact test, $p = 1.000$ (two-tailed).

**Discussion**

**Phase 1.** The first finding of this study was that schizotypal personality, as assessed by the SPQ, is best conceptualized as a dimensional, not categorical, construct. Both MAMBAC and MAXCOV plots closely matched the simulated dimensional plots and did not evidence any peaks such as those seen in the simulated taxonic plots. These findings conflict with those of Fossati et al. (2007). However, in that study, the investigators performed only the MAXCOV procedure, without replicating the results using independent techniques. Moreover, the three indicators used for the analysis were highly correlated within groups, violating the assumption of conditional independence (Meehl 1995). Finally, the authors did not use simulated comparison data. These methodological aspects could partially explain the different findings obtained in the present study. Moreover, the discrepancy in the results may also be due to the different sample sizes in our study and that of Fossati et al.

The present finding about the dimensional latent structure of schizotypal personality is not surprising. It has been widely acknowledged that the nine DSM criteria for SPD identify a heterogeneous construct, composed of various factors. Moreover, a recent study showed that schizotypal personality (at least as assessed by the SPQ) is not a coherent concept: in their item-level factor analysis of the SPQ, Chmielewski and Watson (2008) found that the five factors extracted were weakly correlated to each other. Also our findings indicate a weak correlation between the SPQ factors ($r = .25$). Given these considerations, it is unlikely that the nine DSM criteria for SPD identify a construct with a categorical latent structure. Nevertheless, a taxometric analysis of the individual schizotypal dimensions may detect categorical constructs.

**Phase 2.** Taxometric analyses, performed on three of the four SPQ factors (revealed by an item-level factor analysis), yielded taxonic findings only for the Unusual Beliefs and Experiences construct. This SPQ dimension was best conceptualized as a categorical construct, with a mean base rate of .11. Our results were consistent both with previous taxometric studies on measures of schizotypal perceptual aberration (Lenzenweger and Korfine 1992, Korfine and Lenzenweger 1995, Lenzenweger 1999, Meyer and Keller 2001, Horan et al. 2004), and with the base rate of the schizotypy taxon in the general population estimated by Meehl (1990). Similar findings were reported by Linscott (2007), who obtained taxonic results (with a mean base rate of .13) for positive schizotypy and dimensional results for the Hypochondriasis factor.

In a previous taxometric analysis of the SPQ dimensions, Keller et al. (2001) found evidence of taxonicity for negative schizotypy, and evidence of dimensionality for positive schizotypy. These two dimensions were derived from a factor analysis of the SPQ that grouped subscales pertaining to various schizotypal traits. The obtained factors were different from those found in our study. This could explain the differences between the results presented here and those obtained by Keller et al.

Unlike previous studies employing the Chapman scales (Blanchard et al. 2000; Horan et al. 2004), we failed to identify a latent taxon for negative schizotypy (namely Social Anhedonia). A possible reason for this result may be that the Social Anhedonia Scale (Eckblad et al. 1982) items are related to the lack of pleasure in interpersonal relationships and schizoid withdrawal, while the Social Anhedonia dimension emerged from our factor analysis was a mixture of avoidant behavior, constricted affect and social anxiety.

In the present taxometric analysis, the Mistrust factor was best conceptualized as a dimensional construct. Previously, a similar result was found by Fossati et al. (2001) using a latent class analysis: among the three identified dimensions of SPD, the Paranoid factor might be viewed as a dimensional construct, the Interpersonal-Oddness factor was better represented as a taxonic construct, and the Cognitive-Perceptual factor provided ambiguous results.

**Relatives of schizophrenic patients.** Another important result of the present study was that among the 12 subjects with at least one first-degree relative with a diagnosis of schizophrenia, five (42%) were taxon members on the basis of MAXCOV results for the Unusual Beliefs and Experiences construct. Taxon membership significantly increased the probability of having a first-degree relative with a diagnosis of schizophrenia. Conversely, among the 12 relatives of patients with schizophrenia, only one subject was in the top decile of the Mistrust distribution, and another was in the top decile of the Social Anhedonia distribution.

Previously, Vollema et al. (2002) found that the positive dimension of SPQ (Ideas of Reference, Magical Thinking, Unusual Perceptual Experiences, and Paranoid subscales) reflects the genetic vulnerability to schizophrenia. Similarly, Yaralijan et al. (2000) found that scores on the subscales Ideas of Reference and Unusual Perceptual Experiences were able to distinguish between subjects with a familial history of schizophrenia and controls.

The found association among positive schizotypy and familiarity with schizophrenia conflicts both with Raine’s (2006) model and with a number of studies supporting a familial association between social-interpersonal symptoms and schizophrenia (Tarbox and Pogue-Geile 2011). On the other hand, it has also been observed that relatives of schizophrenic patients tend to deny psychotic-like experiences (Tarbox et al. 2012). Since the SPQ items for Unusual Perceptual Experiences and Magical Thinking are more covert than items of other instruments (such as the Chapman scales), it makes it less likely a defensive response style in relatives (Vollema et al. 2002). These considerations may partially explain the present results. It is our opinion that the role of positive schizotypy as a phenotype for genetic investigation of schizophrenia should be further addressed in future research.

**Limitations.** This study has some limitations. We
employed a self-report measure of schizotypal personality, so these findings would be replicated using both other self-report measures and interview-based instruments. In fact, the results of taxometric analysis may be biased by the assessment procedure.

In the present analyses, the sample size is above the threshold of 300 subjects suggested by Meehl (1995); nevertheless, this may appear a small sample, considering the putative schizotypal taxon (of about .10). However, the detection of a taxon of .11 for the Unusual Beliefs and Experiences construct shows that a small taxon can be revealed in a sample of 400 subjects.

Since the present sample was composed of 82.5% of women, sex differences in schizotypal traits may have biased the results obtained in our study. The reason of such oversampling depends on the fact that our sample was mostly composed of students enrolled in university courses commonly attended by women. Therefore, it is important to replicate the present findings in an evenly mixed gender sample.

Finally, the collection of data regarding the family history of schizophrenia was carried out by a simple self-report question. This is another critical point that may have biased the findings. It is possible that some participants have provided a misleading response because of stigma or lack of knowledge about mental health of their relatives.

References


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